

# Haible Tau Pipe Phaser by RANDOM\*SOURCE

## Updated Bill of Materials 1.02 (19-08-2016) Errors and omissions excepted

All values for +/-15V except as indicated.

**Orange values:** Suggestions for +/-12V supply

### Capacitors (Voltage rating 35V or higher)

<b>1 CV*</b>	CM1	Decoupling cap for the optional CV-Mixer (SMT) - OMIT / INSTALL IF NEEDED (SMT) - AS SMALL AS POSSIBLE
<b>2 10p</b>	C5E, C5F	C0G recommended
<b>3 33p</b>	C2, C5A, C5B	C0G recommended
<b>4 2N2</b>	C5, C5C, C5D, C6	C0G or Styroflex
<b>1 10N</b>	C53	C0G recommended
<b>1 10N</b>	C7	C0G or Styroflex
<b>2 10u 25V Tantal</b>	CP1, CP2	
<b>(36) 40 15nF</b>	C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41, C42, C43, C44, C45, C46, C47, C48, C49, C50, C51	<b>Wima MKS-2(-5) or similar. 5% tolerance recommended but not mandatory. - ONLY IF NO SMT CAPS ARE PRE-INSTALLED!</b> <b>12V: USE 2 LINKS TO BRIDGE 2 POLES (see pcb pic)</b>
<b>7 100nF or 47nF</b>	CB3, CB4, CB5, CB6, CB7, CB8, CB9	<b>Bypass Caps (SMT) on solder side. Voltage rating (35V or higher!) is important!</b>
<b>2 220N</b>	C1, C9	
<b>1 470N</b>	C54	
<b>2 1uF</b>	C3, C4	
<b>1 4.7uF BP (NON-POLAR)</b>	C54A	Film or Electrolytic (BP), 2.5mm lead spacing - cap for the <b>optional LFO Slow speed (low range) mod - connect L* via SPDT switch to UP2 or DOWN1 pin.</b>
<b>1 10u</b>	C8	
<b>1 15u</b>	C52	22uF will do if you can't get 15uF
<b>2 22uF</b>	CB1, CB2	
<b>2 470uF 35V</b>	CR1, CR2	<b>ONLY FOR 18V AC / PSU version!!</b>
<b>10 THAT300P</b>	Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10	Supermatched transistor arrays - alternative to BCM847DS. DO NOT INSTALL BOTH!
<b>20 BCM847</b>	T1, T2, T3, T4, T5, T6, T7, T8, T9, T10, T11, T12, T13, T14, T15, T16, T17, T18, T19, T20	NXP BCM847DS - <b>already soldered in depending on pcb version!</b> - alternative to THAT300! <b>DO NOT INSTALL BOTH!</b>
<b>3 OPA2134</b>	U2, U5, UM	Dual Op amp - install <b>UM only if you plan to use the optional CV mixer / processor.</b>
<b>1 TL072</b>	U6	Alt:5532 - <b>do not use OPA2134 here!</b>
<b>3 TL072/301</b>	U1, U3, U4	Alt: OPA2134
<b>2 1N4148</b>	D1, D2	DIODE
<b>1 LM3046</b>	IC1	NPN Transistor Array (SMT) - <b>already soldered in depending on pcb version!</b>
<b>4 1N4001</b>	DR3, DR4, DR5, DR6	<b>ONLY FOR 18V AC / PSU version!!</b>
<b>1 LM317</b>	UR1	<b>ONLY FOR 18V AC / PSU version!!</b>
<b>1 LM337</b>	UR2	<b>ONLY FOR 18V AC / PSU version!!</b>
<b>1 OR</b>	RS1	<b>PCB V1.01 ONLY! Use OR / Link</b>
<b>2 BEAD</b>	F3, F4	
<b>2 10R</b>	F1, F2	

**2 100R** R13, R14  
**2 240R** RR5, RR6  
**4 330R** R19, R41, R42, RM4  
**2 470R** R15H1, R57  
**1 470R{330R}** R15  
**1 1K TEMP CO** R52T

**ONLY FOR 18V AC / PSU version!!**

Alternatively, use **1K Tempco (+3300ppm/K ...3500ppm/K) - this requires 2 value changes (R53 and T1VOCT)**

**2 620R** R31, R33  
**1 1k** R67  
**2 1k5** R47, R48  
**5 2k7** R6, R56, R64, RR3, RR4  
**1 2k7{3k0}** R63  
**2 3k** R16, R17  
**6 3k3** R10, R12, R20, R22, R23, R24  
**2 5k6** R61, R62  
**2 10k** R58, R69  
**1 12k** R68  
**4 18k** R9, R11, R21, R25  
**1 47k** R53  
**2 30k** R7, R8  
**1 33k{OMIT}** R65

**Use 27K only if Tempco=560R!**

Does not seem to be needed for 12V - relevant for LED behavior only

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**1 56k** R40  
**2 82k** RR1, RR2  
**15 100k** R2, R3, R27, R28, R29, R30, R32, R34, R35, R37, R38, R39, RM1, RM2, RM3  
**1 150k** R66  
**1 150k{100k}** R60  
**1 220k (180k)** R4  
**1 220k{180k}** R49  
**1 470k** R26  
**2 1M** R1, R59  
**3 22M** R43, R44, R51

Sets the low point of the pitch (manual sweep) knob  
 180k: Jürgen's suggestion to allow self-oscillation of resonance (feedback)

**1 100R** GAIN  
**2 50k** PITCH, RESO  
**1 10k** T1VOCT

**Use 5k Trimmer if Tempco=560R!**